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PATENT SPECIFICATION



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PROVISIONAL SPECIFICATION

No. 3672 A.D. 1938.

Improvements in or relating to Machines for Colour Printing

We, GEORGE HADLOW TILLET, formerly of 14, Alexandra Court, Wembley, Middlesex, now of White End Cottage, Hollow Way Lane, Chesham Bois, Buckinghamshire, a British Subject and CHARLES ASHTON LISTER, of Beechmount, Linkfield lane, Redhill, Surrey, a British Subject, do hereby declare the nature of this invention to be as follows:—

10 This invention relates to machines for colour printing, particularly machines for printing colours on continuous lengths of fabric.

Continuous lengths of fabric are now commonly hand printed on long trestles or tables, the printing being done by means of a stencil or silk screen by hand. It is the practice for the pattern which is to be repeated to be printed by hand not continuously but intermittently along the length of the fabric, the space between each immediate printing of the block being just sufficient to be filled in by a further printing or impression of the pattern at a later stage. This is necessary since otherwise the edges of the screen frame would pick up wet colour from the adjacent impression printed immediately previously and this "pick-up" would afterwards be transferred to portions of the fabric where not desired, thus spoiling the finished article.

It is the object of this invention to produce machinery which will enable printing such as has been hereinbefore outlined to be done automatically by machinery.

A printing machine manufactured according to this invention comprises a printing table, a screen frame, a conveyor band capable of receiving the fabric to be printed, a drying frame and a prime mover, gears and guides enabling the conveyor and its coincident fabric to be intermittently passed between the screen and the printing table and enabling the screen to be then lowered and the desired impression of a repeat motif made on the fabric, the fabric being moved and stopped automatically by the machine in

the correct register for the printing of a repeat pattern.

By way of example we will now describe one particular machine constructed according to our invention. 55

This machine comprises a printing table which may well be approximately four feet wide and five feet long and about two feet six inches high. The frame would have a surface of heavy ply board or suitable material and would support the conveyor during the printing operation. The frame of the printing table will also support a drum at one end and a pair of pinching rollers at the other end. 65

Adjacent the printing table is a drying frame through which the conveyor belt passes. The drying frame has a number of ball bearing rollers at the top and guides at the bottom and the conveyor band after passing in a stretched condition over the printing table via the drum and rollers will pass into the drying frame over the top rollers and bottom guides so that sufficient time is taken for any one point of the conveyor to pass right through to dry a wet printed fabric laid thereon. 70

Arranged over the printing table is a screen frame lifted by cams while the fabric moves over the printing table. 80

In use the fabric to be printed will be laid upon the conveyor band and held between the apertures on each side. It will pass over the printing table and be printed by the screen frame being lowered upon it; the fabric will then pass on until it is correctly spaced so that a further repeat of the pattern may be made leaving a space between the two impressions the exact width of the repeat. 85

It then passes over the drum at the end of the printing table previously described and into the drying frame. At the top of the frame the conveyor band and its fabric may pass over normal ball bearing rollers since in this case the fabric will be on the outside of the bend or turn and thus will not rub against the rollers. 90 100

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At the bottom of the frame where the fabric will be on the inside of the bent or turn it will not touch the guides since the conveyor band will be held taut and in position by the sprockets only.

By the time the fabric has passed through the drying frame and is ready for the impression of the repeat pattern in the spaces left between previous impressions, it will have dried so that no

wet colour or "pick up" will be transferred to the edges of the screen frame.

Constructional modifications of our invention may be made without departing from the scope thereof.

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Dated this 5th day of February, 1938.

GEORGE HADLOW TILLET,
CHARLES ASHTON LISTER.

PROVISIONAL SPECIFICATION

No. 24704 A.D. 1938.

Improvements in or relating to Colour-Printing

We, GEORGE HADLOW TILLET, a British Subject, of White End Cottage, Hollow Way Lane, Chesham Bois, Buckinghamshire, and CHARLES ASHTON LISTER, a British Subject, of Beechmount, Linkfield Lane, Redhill, Surrey, do hereby declare the nature of this invention to be as follows:—

This invention is for improvements in or relating to colour-printing machines for printing repeat patterns by means of a stencil upon continuous lengths of fabric, paper or the like, hereinafter referred to generally as webs, and methods of colour-printing the same.

Heretofore, such webs have been hand printed on long trestles or tables, by means of a manually-operated stencil, such as a silk screen, mounted in a frame, and the present invention has for its main object to provide an improved method of colour-printing webs by means of stencils which shall effect a very considerable saving of time and labour as compared with the methods used heretofore.

Another object is to provide an improved colour-printing machine for printing webs by means of a stencil which shall occupy a very much smaller space, and can be operated at a much higher speed than the apparatus used heretofore.

According to the invention there is provided a method of colour-printing webs by means of a stencil, through which the ink is supplied to an underlying web on a supporting bed, consisting in feeding the web after one printing operation a distance equal to twice the width of the print measured in the direction of length of the web, then printing on the web again and so on, whereby the web, has applied to it a plurality of spaced repeats that alternate with spaces of the same width as the repeats, and then reversing the direction of feed of the web and printing alternate repeats at the spaces in register with the first-mentioned spaced repeats.

Preferably, the web, when being provided with the said spaced repeats, is unwound from a feed roll, passes over the bed and is wound up on a take-up or batching roll, which serves as a feed roll when the direction of feed is reversed and the alternate repeats are printed.

Conveniently, two cylinders or drums alternately serve one as a feed roll, and the other as a take-up roll for the web.

A stencil frame that is pivoted at one side of the web and extends transversely across it, carries a squeegee arranged to reciprocate over the stencil in a direction lying transversely of the length of the web, and preferably, at the end of the outward stroke of the squeegee, it is automatically lifted over the mass of colour or ink swept in front of it over the stencil, preparatory to sweeping the mass back over the stencil during its return stroke.

The invention also provides a machine for colour-printing webs according to the method set forth above, which machine comprises a bed for supporting the web to be printed, a stencil frame carrying a stencil movable into and out of an operative position in relation to the web on the bed for use in intermittently printing repeats spaced apart on the web in the direction of its length, in combination with feed means for intermittently feeding the web first in one direction and then in the opposite direction over the bed.

Preferably, the feed means comprises a combined take-up and feed batching roll, and means for rotating it in one direction to receive the web after it has been printed with a plurality of spaced repeats that alternate with spaces of the same width as the repeats, and for rotating it in the opposite direction to serve as a feed roll when printing alternate repeats at the spaces in register with the first-mentioned spaced repeats.

The feed means may comprise two combined feed and take-up batching rolls each serving alternately for feeding and

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taking up the web as set forth in the preceding paragraph during the printing of the spaced and alternate repeats.

The improved machine is preferably used with a web affixed, while flat, by adhesive to a flat carrier band, and the feed means preferably comprises a feed roll and take-up roll each of such a diameter that when the band lies on it, the curvature is such that the difference in length of the radii of curvature of the web and band is negligible as regards its effect on the relative degree of tension to which the web and band are subjected due to their curvature.

The web may extend over the bed between two batching rolls at opposite ends of the bed, and may pass over positioning means for positioning the web, with or without a carrier band therefor, on the bed in a direction transversely of the direction of travel of the web.

Each batching roll may be provided with means for supplying conditioned air to the printed web on it.

According to one method of carrying the invention into practice a colour-printing machine for printing fabrics and the like according to the improved method, comprises a main frame having an upper horizontal portion constituting an operating table or bed, and two batching rolls journaled one at each end of the frame. Each of these rolls is in the form of a cylinder or drum of relatively large diameter, e.g. three to six feet, and alternately serve for feeding and taking up the web to be printed that extends over the bed from one roll to the other. A stencil frame described hereinafter is pivotally mounted on the frame at the level of the bed to rock about an axis that is fixed at one side of the bed and extends in the direction of length of the web.

Positioning means for positioning the web, with or without a carrier band, on the bed in a direction transversely of the length of the web, comprises two guide rollers each situated between one end of the bed and the adjacent roll. Each of these guide rollers carries two discs or flanges spaced apart a distance equal to the width of the web or band.

Each batching roll is preferably provided with means for supplying conditioned, i.e. dry air, to the printed web thereon. This means may comprise two drying chambers, each containing one of the batching rolls, and connected by a conduit common to them both to a supply of hot or cold dry air. The conditioned air may serve to dry the printed web before it is actually rolled round a batching roll.

Before being printed, the web, which

may be a textile fabric, such as cotton, linen, natural silk or artificial silk, or wool, is preferably fixed by an adhesive, such as gum, to a carrier band which preferably consists of relatively stiff material, such as linoleum, American cloth, rubberised woven fabric, such as duck, or stiff paper which may be waxed or waterproofed.

When the carrier band is waxed, the web may in some cases be fixed by means of a heated roller without the use of an additional adhesive. Stiff paper, known in the Trade as "glazed buff casing," is suitable as a carrier band; it may contain casein for waterproofing it. When supported on such a carrier band, the web is stiff in a transverse direction and can be correctly positioned on the bed by the discs or flanges aforesaid on the guide rollers.

The batching rolls may be rotated in any convenient manner. For example, they may be driven in unison either manually or by power, e.g. an electric motor, and may be geared together by gearing, such as a spiral friction drive or chain gear which admits of "slip," so that the peripheral speeds of the two rolls shall be uniform even when their diameter changes owing to variation in the amount of web wound on them.

Preferably, there is combined with each batching roll or drum braking means for instantaneously stopping it when desired; the brakes may be operated by a spring and held off against the action of the spring by an electromagnetic device which controls a catch. The electric circuit may be of known arrangement, but may pass through contacts arranged immediately above the path of the web over the bed, so that when other contacts placed on the web arrive at a predetermined situation they complete the electric circuit, thereby operating the catch for the brakes and allowing the latter to stop the rotation of the rolls. At each printing operation by means of the stencil there may be printed on the edge of the web or on its carrier band a small mark of an electrically-conducting material, e.g. graphite, black lead or gold size mixed with a conductor, which operates as an electric contact piece when it reaches the circuit-opening position referred to above.

The stencil is preferably carried by a rectangular mount, e.g. of wood, and is carried by the rectangular stencil frame preferably of metal, and having hinges at one end. Two guide rails constituted by metal tubes are mounted in spaced relation on the sides of the frame. Two sleeves constituting bearings are provided one on each rail, and rotatory

bodies, such as steel balls, are arranged within each sleeve, closure means at the ends of the sleeves being provided for retaining the balls therein. The squeegee 5 that is reciprocable over the stencil is mounted on the sleeves of these anti-friction bearings so as to be freely slidable in the stencil frame from one end thereof to the other.

10 Lifting means is preferably arranged automatically to lift the squeegee at the end of its outward stroke over the mass of colour or ink swept in front of it over the stencil.

15 The mount carrying the stencil preferably has at least two stops that cooperate with the stencil frame and position the stencil in relation thereto in two directions lying at right angles to one 20 another. One of these stops may be a metal arm arranged to lie against a pin on an end member of the stencil frame, while one or more other stops may be a headed screw for bearing against the side 25 face of the same end member. When placed in position the mount can be clamped in the stencil frame by means of the headed screw.

When in use, the carrier band with the 30 web on it, is wound almost completely on to one batching drum and printing is commenced at one end of the web. The first impression is made by lowering the stencil frame and reciprocating the 35 squeegee after colour or ink has been supplied to the stencil, whereupon the stencil is rocked upwards, this movement preferably being assisted by a counterweight. The band is then fed forwards a 40 distance equal to twice the width of the print measured in the direction of length of the web, so that there is no danger of the edges of the stencil mount picking up 45 printed immediately previously, and of this pick-up being subsequently transferred to the web and spoiling the finished article. When the band reaches its new position, the electric circuit is completed, 50 the brake is applied to the batching drums, and the band is held in position for the next impression, when the printing operation is repeated, and so on, thereby providing a number of spaced 55 repeats on the web, until the latter is finally wound up on the take-up or batching drum. The direction of feed is then reversed, whereby the latter drum becomes a feed drum, the spaces between 60 the repeats are printed in succession, and the printed web is wound up on the first-mentioned drum which becomes a take-up drum. This operation may be repeated as many times as is necessary for providing 65 a finished pattern on the web, depend-

ing on the number of colours that have to be used.

In some cases, instead of winding the carrier band and its web on to one of the two batching drums when commencing 70 the printing of a web, the same may be unwound from a separate feed spindle at the feed-end of the bed distinct from the batching drums.

The invention also provides a machine 75 for colour-printing webs, comprising a bed for supporting the web to be printed, a pivoted stencil frame, carrying a stencil, movable into and out of an operative position in relation to the web on the 80 bed for use in intermittently printing repeats on the web in the direction of its length, and feed means for intermittently feeding the web over the bed, preferably first in one direction and then in the 85 opposite direction. This machine can be used for printing repeats spaced on the web as described above, or for printing a succession of repeats arranged close together in a row in register one with 90 another without spaces between them.

Whichever mode of operation is used, the screen frame having guides along which the squeegee is movable over the 95 screen, may be provided with manually-operable means for lifting the squeegee at the end of its outward stroke.

The rubber blade of the squeegee is preferably carried in a groove in a relatively heavy head, e.g. of metal, which may be 100 detachably carried in a metal, which may be detachably carried in a metal bar of inverted U-section and secured therein by thumbscrews or other manually-operable 105 fasteners.

The squeegee with its head and supporting bar is preferably so heavy that when an operator pushes it by means of a long handle member attached to the centre of the bar, sufficient pressure is exerted 110 under gravity by the squeegee on the stencil, without the operator having to exert any manual downward pressure for effecting the printing operation. If desired, the pressure under gravity can be 115 varied by adding or removing weights carried by the squeegee, or by using parts, such as squeegee heads, or lighter or heavier materials.

When printing the repeats, it is very 120 important that the web shall be positioned precisely at the required situation each time it is intermittently fed forward, and precision positioning means, as described hereinafter, is provided for 125 this purpose. Such positioning means comprises a mark that is movable with the web, and enlarging means for producing an enlarged image of the mark on a screen or like surface visible by the 130

operator.

The enlarging means may be optical and may comprise a source of light for directing a beam of light on to the mark for producing an enlarged image thereof.

The mark may be in the form of a hole, preferably in the carrier band of the web.

Conveniently, the carrier band of the web has a hole in one margin thereof, a source of light situated at one side of the band is arranged to throw a beam of light through the hole on to a screen that is situated at the other side of the band and is visible to the operator, and a magnifying lens is situated between the screen and the hole.

Preferably, the screen carries means for making a mark on the web or on the carrier band thereof, each time it is positioned for performing a printing operation.

This means may be a punch for punching a hole in the carrier band of the web.

The projecting lens may be placed in a convenient position above or below the carrier band. When commencing printing of a web, two holes accurately spaced apart the correct distance according to the repeats, are made in the carrier band, the first serving for the production of an image in the form of a circular disc of

light on a screen or other suitable surface, and the second preferably being punched when printing the first repeat. Before feeding the web, a positioning circle or other permanent mark is drawn on the screen to correspond with the image of the hole enlarged by the lens. This enables the operator to move the carrier band until the enlarged image formed by the second hole registers exactly with the circle or other mark drawn on the screen.

The invention is not restricted to the precise modes of operation and details of construction described above. For example, in some cases the axis of pivoting of the stencil frame may lie transversely of the direction of length of the web. Also, paper and other material, e.g. linoleum, may be printed in a like manner with colour or coloured ink. Further, the arrangements described in the co-pending Patent Application No. 3672/38 describing a cognate invention may, in some cases, be employed.

Dated this 22nd day of August, 1938.

BOULT, WADE & TENNANT,
111 & 112, Hatton Garden,
London, E.C.1,
Chartered Patent Agents.

COMPLETE SPECIFICATION

Improvements in or relating to Colour-Printing

We, GEORGE HADLOW TILLET, a British Subject, of White End Cottage, Hollow Way Lane, Chesham Bois, Buckinghamshire, and CHARLES ASHTON LISTER, a British Subject, of Beechmount, Linkfield Lane, Redhill, Surrey, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention is for improvements in or relating to colour-printing machines for printing repeat patterns by means of a stencil upon continuous lengths of fabric, paper or the like, hereinafter referred to generally as webs, and methods of colour-printing the same.

Heretofore, such webs have been hand printed on long tables, by means of a manually-operated stencil, such as a silk screen, mounted in a frame, and the present invention has for its main object to provide an improved method of colour-printing webs by means of stencils which shall effect a very considerable saving of time and labour as compared with the methods used heretofore.

Another object is to provide an improved colour-printing machine for printing webs by means of a stencil which shall occupy a very much smaller space, and can be operated at a much higher speed than the apparatus used heretofore.

According to the invention there is provided a method of colour-printing webs by means of a stencil, through which the ink is supplied to an underlying web on a supporting bed, consisting in feeding the web over the bed in one direction after one printing operation a distance equal to twice the width of the print measured in the direction of length of the web, printing a second impression, then feeding the web the same distance in the same direction and printing on it again, and so on, whereby the web has applied to it a plurality of spaced repeats that alternate with spaces of the same width as the repeats, and then intermittently feeding the web provided with spaced repeats over the bed and printing alternate repeats at the spaces in register with the first-mentioned spaced repeats.

Preferably, the web, when being provided with the said spaced repeats, is

unwound from a feed roll, passes over the bed and is wound up on a take-up or batching roll, which serves as a feed roll when the direction of feed is reversed and the alternate repeats are printed.

Conveniently, two cylinders or drums alternately serve one as a feed roll, and the other as a take-up roll for the web.

The invention also provides a machine for colour-printing webs comprising a bed for supporting the web to be printed, a pivoted stencil frame carrying a stencil movable into and out of an operative position in relation to the web on the bed for use in intermittently printing repeats on the web in the direction of its length, and feed means for intermittently feeding the web over the bed, which machine is characterised in that the feed means is arranged to feed the web intermittently over the bed in opposite directions.

Preferably, the feed means comprises a combined take-up and feed batching roll, and means for rotating it to receive the web after it has been printed with a plurality of repeats.

The feed means may comprise two combined feed and take-up batching rolls each serving alternately for feeding and taking up the web as set forth in the preceding paragraph during the printing of the spaced and alternate repeats.

The improved machine is preferably used with a web affixed, while flat, by adhesive to a flat carrier band, and the feed means preferably comprises a feed roll and take-up roll each of such a diameter that when the band lies on it, the curvature is such that the difference in length of the radii of curvature of the web and band is negligible as regards its effect on the relative degree of tension to which the web and band are subjected due to their curvature.

The web may extend over the bed between two batching rolls at opposite ends of the bed, and may pass over positioning means for positioning the web, with or without a carrier band therefor, on the bed in a direction transversely of the direction of travel of the web.

Each batching roll may be provided with means for supplying conditioned air to the printed web on it.

The invention will now be described by way of example with reference to the accompanying drawings, wherein:—

Figure 1 is an elevation showing one form of colour-printing machine according to the invention for carrying the improved method into practice,

Figure 2 is a top plan view thereof, and

Figure 3 is a vertical section taken on the line 3—3 in Figure 1, and

Figure 4 is an enlarged detail sectional

view taken on the line 4—4 in Figure 2;

Figure 5 is a sectional elevation, on a scale larger than that of Figures 1 to 3, taken on the line 5—5 in Figure 2 showing the stencil frame with a squeegee in one position thereof, and

Figure 6 is a like view of the parts shown in Figure 5, but with the squeegee in another position, and

Figure 7 is a side elevation of the lifted stencil frame, and

Figure 8 is a diagrammatic sectional view on an enlarged scale illustrating a carrier band carrying the web to be printed on, and optical registering means for the web.

Like reference characters designate like parts throughout the several views.

Referring first to Figures 1 to 3, a colour-printing machine for printing fabrics and the like according to the method described above, comprises a main frame having legs 10 carrying an upper horizontal portion 12 which carries a horizontal table or bed 14 for supporting a web 16 to be printed upon in colour by means of a stencil mounted on a stencil frame as described hereinafter. Two batching rolls 18, 20 are respectively journaled by means of spindles 22, 24 in bearings 26, 28, respectively, on the frame at its ends. Each of these rolls 18, 20 is in the form of a cylinder or flanged drum of relatively large diameter, e.g. 3 feet, and serves for feeding the web to be printed over the bed 14, or taking up the printed web, or both feeding and taking up the web. As shown at 30 the spindles may have annular grooves for receiving co-operating annular ribs of the bearings and thereby positioning the rolls in the frame in the axial direction of their spindles.

Positioning means for positioning the web 16, with or without a carrier band, on the bed in a direction transversely of the length of the web, comprises two guide rollers 32, 34, situated between the ends of the bed 14 and the rolls. These rollers 32, 34 carry flanged collars 36 slidable along them and carrying fixing screws 37. The distances between the two flanges of each of these rollers is equal to the width of the web, or of the band carrying the latter.

The batching rolls 18, 20 may be rotated in any convenient manner. As illustrated, a manually-driven belt drive of similar construction is provided for each roll. Each belt drive comprises a grooved pulley 38 of relatively large diameter on one end of the drum, and a smaller grooved pulley 40 fast on a shaft 42 that is journaled in the frame and carries at the front side of the latter, a

hand wheel 44, a belt 46 or other flexible transmission member being carried by the pulleys 38, 40. By rotating one or other of the hand wheels 44, the web 16 can be fed in either direction over the bed 14.

In some cases, the rolls 18, 20 may be power-driven, e.g. by an electric motor, and may be geared together by gearing, such as a spiral friction drive or chain gear which admits of "slip", so that the peripheral speeds of the two rolls shall be uniform even when their diameter changes owing to variation in the amount of web wound on them.

When power driven, there may be combined with each batching roll or drum, braking means, not shown, for instantaneously stopping it when desired; the brakes may be operated by a spring and held off against the action of the spring by an electromagnetic device which controls a catch. The electric circuit may be of known arrangement, but may pass through contacts arranged immediately above the path of the web over the bed, so that when other contacts placed on the web arrive at a predetermined situation they complete the electric circuit, thereby operating the catch for the brakes and allowing the latter to stop the rotation of the rolls. As described hereinafter, at each printing operation by means of the stencil there may be printed on the edge of the web or on its carrier band a small mark of an electrically-conducting material, e.g. graphite, black lead or gold size mixed with a conductor, which operates as an electric contact piece when it reaches the circuit-opening position referred to above.

Each batching roll is preferably provided with means for supplying conditioned, e.g. dry, air to the printed web thereon. This means may comprise a supply conduit or trunk 48 for supplying fluid drying medium, e.g. hot or cold air, to two chambers 49, 50 having outlets 51, 52, respectively, which embrace the rolls at their peripheries. Conditioned air escaping from the chambers 49, 50 may serve to dry the printed web before it is actually rolled round one of the batching rolls.

Before being inserted into the machine, and before being printed, the web, which may be a textile fabric such as cotton, linen, natural silk or artificial silk, or wool, is preferably fixed by an adhesive, such as gum, to a carrier band which preferably consists of relatively stiff material, such as linoleum, American cloth, rubberised woven fabric such as duck, or stiff paper which may be waxed or waterproofed. A fragment of such a carrier band 54, together with the web 16 affixed

thereto, is diagrammatically illustrated in Figure 8 on an enlarged scale.

When the carrier band 54 is waxed, the web 16 may in some cases be fixed by means of a heated roller without the use of an additional adhesive. Stiff paper, known in the Trade as "glazed buff casing", is suitable as a carrier band; it may contain casein for waterproofing it. When supported on such a carrier band, the web is stiff in a transverse direction and can be correctly positioned on the bed 14 by the discs or flanges 36 on the guide rollers 32, 34.

As shown most clearly in Figures 5 and 6, a stencil 56, such as a silk screen, is carried in a stencil frame designated generally 58. This frame 58 carries a rectangular mount 60, e.g. of wood, having the stencil 56 at its underside. A rectangular frame having a rear end member 62, side members 162, and a front end member 63, preferably of metal, is pivotally mounted by means of its rear end member 62 at 66 on the upper part 12 of the main frame. A second rear end member 65 and a second front end member 67 are adjustable endwise in this frame 62, 162, 63 by means of nut-equipped screws fixed to their ends. The side members 162 carry guide rails 64 constituted by metal tubes, and two sleeves 68 constituting bearings are slidable one along each rail. These sleeves 68 may make a sliding fit with the rails 64, or, alternatively, rotatory bodies, such as steel balls, may be arranged within each sleeve, in which case closure means at the ends of the sleeves will preferably be provided for retaining the balls therein. A squeegee 70, constituted by a strip of rubber carried by a bar 72 forming the head of the squeegee, is reciprocable over the stencil, and is mounted on the sleeves 68 so as to be freely slidable in the stencil frame from one end thereof to the other. As illustrated, two bars 74, 76, each of inverted L-shape in cross-section, carry the head 72 of the squeegee between them, and are operatively connected to the sleeves 68.

The squeegee is provided with a handle member 78 that is relatively long so that an operator at the front side of the machine can readily reciprocate it the entire length of the stencil between its front and rear ends. This handle member 78 also constitutes lifting means for lifting the squeegee 70 at the end of its outward stroke over the mass of colour or ink swept in front of it over the stencil. As shown most clearly in Figure 1, the two bars 74, 76 are fixed at their ends to the top of shoes 80 of inverted U-section which lie along and embrace the sleeves 130

68 and are pivoted to their ends at 82. Consequently, when the handle member 78 is lifted to the position shown in Figure 6, the squeegee 70 can be moved from the front to the rear side of the mass of colour indicated at 84 that may have collected near the rear end of the screen during the printing operation.

The mount 60 carrying the stencil 56 may be supported in the stencil frame in any convenient manner. As illustrated, the rear end of this mount is supported by two lugs 86 fixed to the member 65 of the stencil frame, while, as shown most clearly in Figure 4, the front end of the mount 60 carries two headed screws 88 extending forwardly from it. The member 67 of the stencil frame is of L-section, on the lower horizontal web 69 of which the screws 88 rest and support the mount 60. In order to fix these screws 88 in position, a flat bar 90 is placed over them, and an L-shaped bar 92 is placed thereon. These bars are perforated to receive nut-equipped studs 94 which are carried by the horizontal limb 69 of the member 67.

Lifting means is provided for rocking the stencil frame upwards and thereby lifting the stencil 56 away from the web beneath it. As shown most clearly in Figures 1, 3 and 7, this lifting means comprises a treadle member 96 that is pivoted at 98 at the rear side of the main frame and extends towards the front side where it is attached at 100 to one end of a cord 102, chain or the like that is carried by a pulley 104 and has its other end connected to the lower end of a vertical lifting rod 106 that is movable in guides 108 on the main frame and has at its upper end a shoe 110 supporting the front end of member 63. By depressing the front end of the treadle 96 the stencil frame can be readily lifted from its operative position shown in Figures 5 and 6 to its elevated position shown in Figure 7, in which position the printed web can be readily removed from the machine and a new one inserted.

Means for marking the web or its carrier band for registering purposes is provided at any convenient situation on the top of the main frame. As shown most clearly in Figures 2 and 7, a marking device comprises an inked pad 114 provided on the bed 14 at a situation adjacent to the front longitudinal edge of the web. An inking roller 116 carried by a blade spring 118 attached to the underside of the end member 63 of the stencil frame is so arranged that when the stencil frame is lifted in its position shown in Figure 7, the ink roller 116 is on the pad 114, but when the stencil frame is lowered, the roller runs on to the web 16 or

its carrier band and makes a mark, which may be electrically conducting, thereon.

When the machine is in use, the web 16 alone, or the carrier band 54 with the web 16 on it, is wound almost completely on to one batching drum and printing is commenced at one end of the web. The first impression is made by lowering the stencil frame, and reciprocating the squeegee 70 after colour has been supplied to the top face of the stencil, whereupon the stencil is rocked upwards by the described lifting means, this movement preferably being assisted by one or more counterweights 120 each adjustably carried by an arm 122 fixed to the stencil frame at its rear end. The web is then fed forwards, by turning a batching roll, a distance equal to twice the width of the print measured in the direction of length of the web, whereupon the stencil is lifted again, the web is fed forwards the same distance, and so on, whereby the web has applied to it a plurality of spaced repeats that alternate with spaces of the same width as the repeats. Each time the stencil is lowered, a mark is made by the printing roller 116 on the web or its band, and when the web is fed forward, this mark is placed into register with an index 124 marked on the top of the bed 14, as shown in Figure 2. When commencing printing of a web, the index 124 will be placed at such a distance from the marking roller 116 that it is exactly equal to twice the width of a repeat to be printed. The web, provided with spaced repeats, will then be fed intermittently over the bed again, in the same or in the opposite direction, and the alternate repeats will be printed at the spaces in register with the first-mentioned spaced repeats. If the direction of feed is reversed, the batching drum on which the web is first taken up becomes a feed drum, and the web provided with adjacent repeats along its length is wound up on the drum first used which becomes a take-up drum. This operation may be repeated as many times as is necessary for providing a finished pattern on the web, depending on the number of colours that have to be used.

When an electric motor is used for operating the machine, electrical contacts, which are preferably adjustable, may be arranged to co-operate with printed graphite or the like on the band. Also, provision may be made that the operation of raising the stencil frame ensures that brakes provided on the motor-driven drums shall be released therefrom.

Owing to the drums being readily detachable from their bearings, either of them can be used as a batching drum, on to which an unprinted web can be wound

in the first instance to serve as a feed drum. Instead of winding the web, with or without its carrier band, on to one of the two batching drums, however, when
 5 commencing the printing of a web, the same may be unwound from a separate feed spindle distinct from the batching drums mounted in any convenient position at the feed-end of the bed.

10 The squeegee with its head and supporting bar is preferably so heavy that when an operator pushes it by means of its long handle member, sufficient pressure is exerted under gravity by the
 15 squeegee on the stencil, without the operator having to exert any manual downward pressure for effecting the printing operation. If desired, the pressure under gravity can be varied by adding
 20 weights to or removing them from the squeegee, or by using parts, such as squeegee heads, of light or heavier materials.

In some cases, optical positioning means may be provided for registering
 25 purposes. As diagrammatically shown in Figure 8, such positioning means may comprise a mark in the form of a hole 126 in the carrier band 54, and optical enlarging means for producing an enlarged
 30 image of the mark on a screen 128 or like surface visible by the operator. This enlarging means may comprise a source of light 130 below the bed for directing a
 35 beam of light through the hole on to the screen situated above the machine. If desired, a magnifying lens 132 may be situated between the screen and the hole. The stencil frame may carry a punch, not
 40 shown, for punching a hole in the carrier band each time the stencil is lowered for performing a printing operation. When commencing printing of a web, two holes
 45 accurately spaced apart the correct distance according to the repeats are made in the carrier band, the first serving for the production of an image in the form of a circular disc of light on the screen, and the second preferably being punched
 50 when printing the first repeat. Before feeding the web, a positioning circle or other permanent mark may be drawn on the screen 128 to correspond with the image of the hole enlarged by the lens.
 55 This enables the operator to move the carrier band until the enlarged image formed by the second hole registers exactly with the circle or other mark drawn on the screen.

60 Various modifications may be made in the details of construction described above without departing from the invention. For example, in some cases the axis of pivoting of the stencil frame may lie
 65 transversely of the direction of length of

the web. Also, paper and other material, e.g. linoleum, may be printed in a like manner with colour or coloured ink.

Having now particularly described and ascertained the nature of our said inven-
 70 tion and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of colour-printing webs by means of a stencil, through which the
 75 ink is supplied to an underlying web on a supporting bed, consisting in feeding the web over the bed in one direction after one printing operation a distance
 80 equal to twice the width of the print measured in the direction of length of the web, printing a second impression, then feeding the web the same distance in the same direction and printing on it again,
 85 and so on, whereby the web has applied to it a plurality of spaced repeats that alternate with spaces of the same width as the repeats, and then intermittently feeding the web provided with spaced repeats
 90 over the bed and printing alternate repeats at the spaces in register with the first-mentioned spaced repeats.

2. A method of colour-printing webs according to Claim 1, wherein, after
 95 printing the first-mentioned spaced repeats, the direction of feed of the web is reversed for printing the alternate repeats.

3. A method of colour-printing webs according to Claim 2, wherein the web,
 100 when being provided with said spaced repeats, is unwound from a feed roll, passes over the bed and is wound up on a take-up or batching roll, which serves as
 105 a feed roll when the direction of feed is reversed and the alternate repeats are printed.

4. A machine for colour-printing webs, comprising a bed for supporting the web
 110 to be printed, a pivoted stencil frame carrying a stencil movable into and out of an operative position in relation to the web on the bed for use in intermittently printing repeats on the web in the direction of its length, and feed means for
 115 intermittently feeding the web over the bed, characterised in that the feed means is arranged to feed the web intermittently over the bed in opposite directions.

5. A machine according to Claim 4,
 120 wherein the feed means comprises a combined take-up and feed batching roll, and means for rotating it to receive the web after it has been printed with a plurality of repeats.

6. A machine according to Claim 4 or
 125 Claim 5, wherein the feed means comprises two combined feed and take-up batching rolls each serving alternately for feeding and taking up the web.
 180

7. A machine according to any of the preceding Claims 4 to 6 for use with a web affixed, while flat, by adhesive to a flat carrier band, wherein the feed means
5 comprises a feed roll and take-up roll each of such a diameter that when the band lies on it, the curvature is such that the difference in length of the radii of curvature of the web and band is
10 negligible as regards its effect on the relative degree of tension to which the web and band are subjected due to their curvature.

8. A machine according to any of the preceding Claims 4 to 6, wherein the web
15 extends over the bed between two combined feed and take-up rolls at opposite ends of the bed, and passes over positioning means for positioning the web, with
20 or without a carrier band therefor, on the bed in a direction transversely of the direction of travel of the web.

9. A machine according to Claim 8, wherein the positioning means comprises
25 two guide rollers each situated between one end of the bed and the adjacent roll, which guide rollers carry each two axially adjustable discs or flanges spaced apart a distance equal to the width of the web or
30 band.

10. A machine according to any of the preceding Claims 5 to 9, wherein each batching roll is provided with means for supplying conditioned air to the printed
35 web thereon.

11. A machine according to any of the preceding Claims 4 to 10, wherein the frame carrying the stencil is mounted to rock about an axis that lies at one side
40 of the bed and extends in the direction of length of the web.

12. A machine according to any of the preceding claims wherein a squeegee reciprocable over the stencil is mounted
45 by means of bearings so as to be freely slidable in the stencil frame, characterised in that a said bearing comprises a sleeve that surrounds a stencil-frame member of circular cross-section.

13. A machine according to any of the preceding Claims 4 to 12, wherein a mount carrying the stencil in the stencil frame carries at least two stops that co-operate with the stencil frame and position
55 the stencil in relation thereto in two

directions lying at right angles one to the other.

14. A machine according to any of the preceding Claims 4 to 12, wherein optical positioning means for the web is provided
60 for registering purposes.

15. A machine according to Claim 14, wherein the optical positioning means comprises a hole in the carrier band of the web, and a source of light at one side
65 of the hole for throwing a beam of light on to a screen at the other side thereof.

16. A machine according to any of the preceding Claims 4 to 15, wherein marking means is arranged to provide the web
70 automatically with a mark each time the stencil is moved from its inoperative to its operative position in relation to the web.

17. A machine according to Claim 16, wherein the automatic marking means comprises an inked pad fixed in relation to the web, and an inking roller that is carried by the stencil frame and is movable from off the pad and on to the web or
80 its carrier band when the stencil is placed on the web, and is returned to the pad when the stencil is removed from the web.

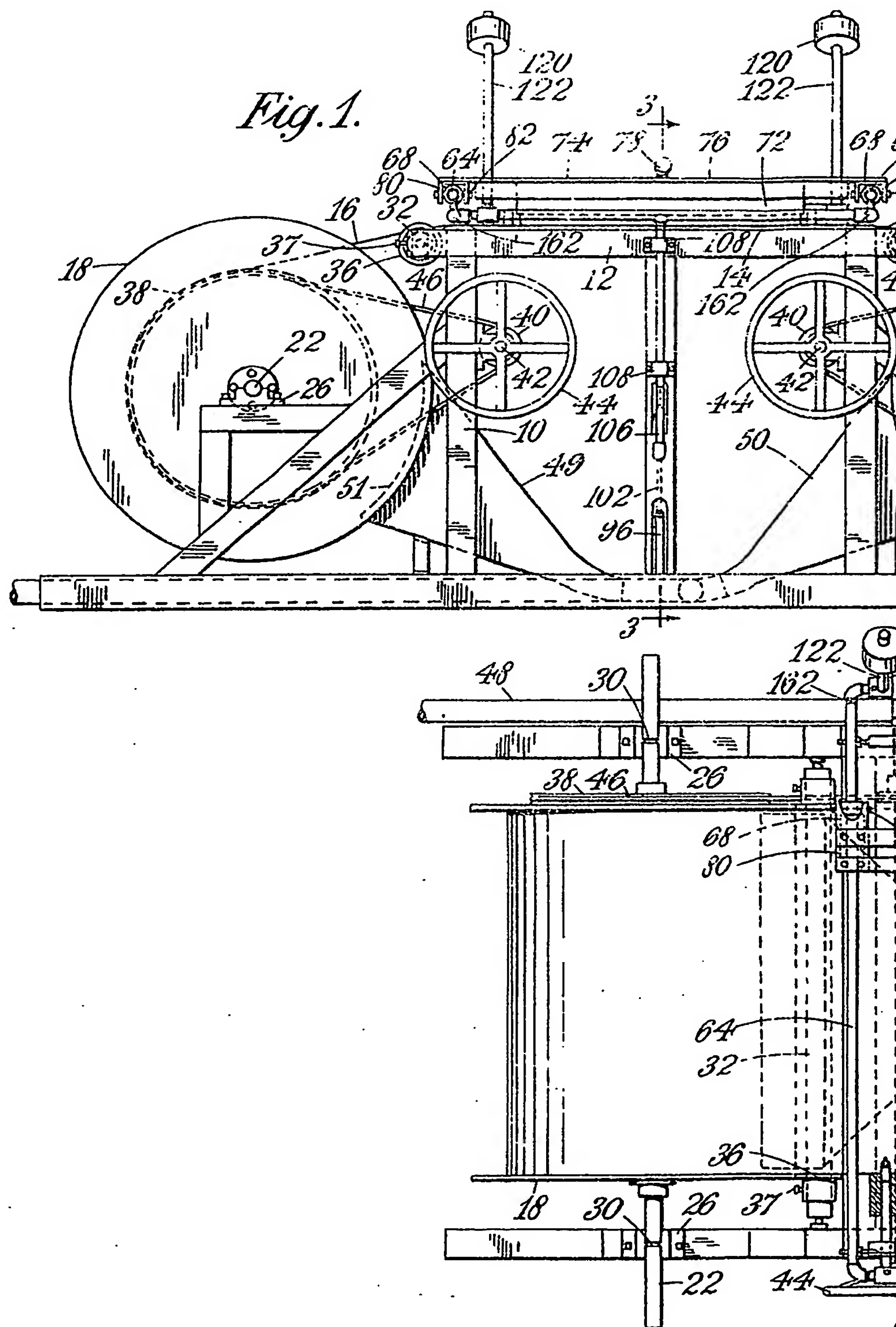
18. A machine according to any of the preceding Claims 4 to 17, wherein a
85 squeegee reciprocable over the stencil has a handle member substantially as long as the width of the web, and is pivotally mounted on bearings so as to be freely slidable in the stencil frame, for the purpose described.

19. A machine according to any of the preceding Claims 4 to 18, wherein lifting means, operable by a treadle, is arranged to rock the stencil frame out of and into
95 its operative position.

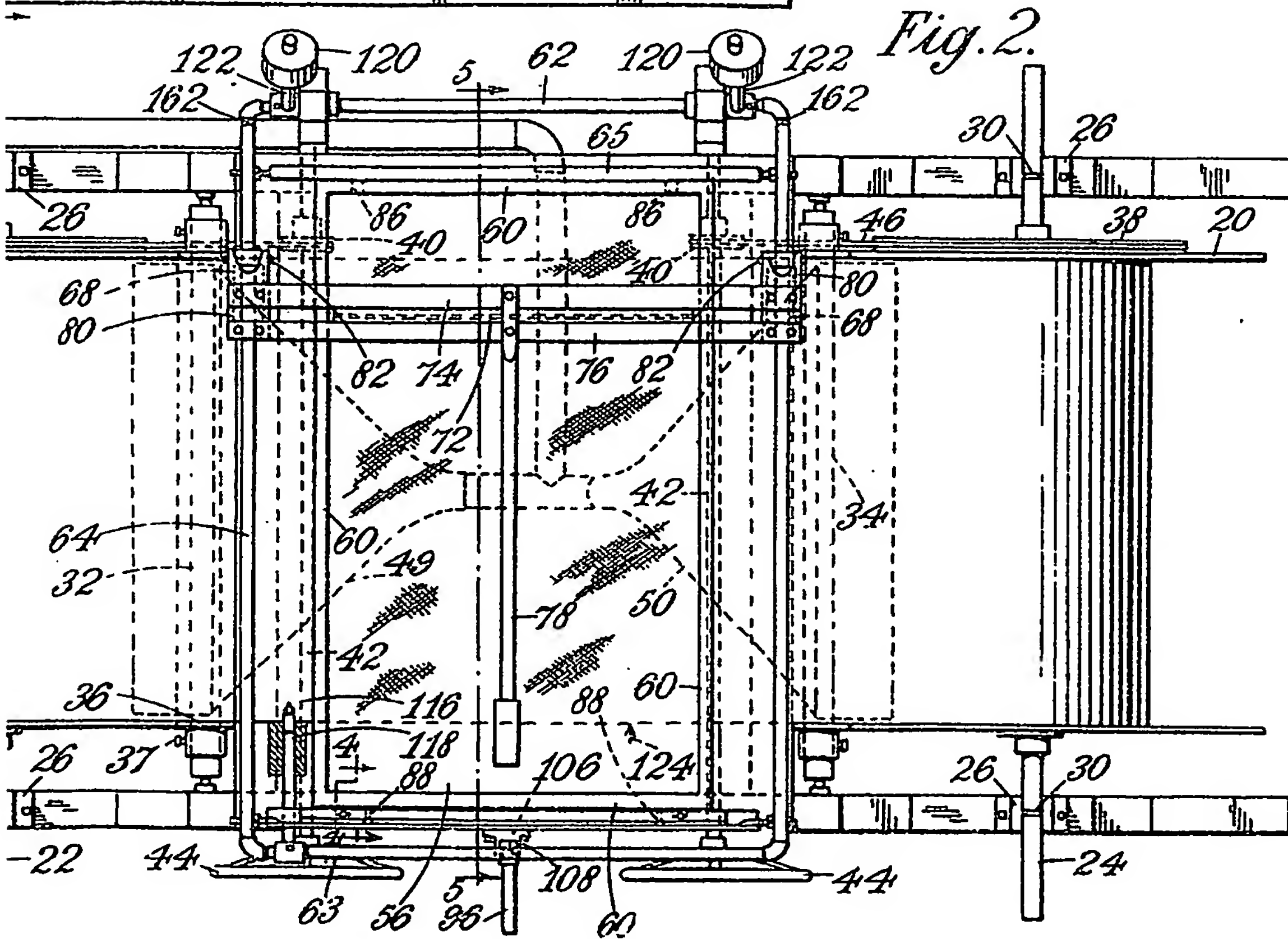
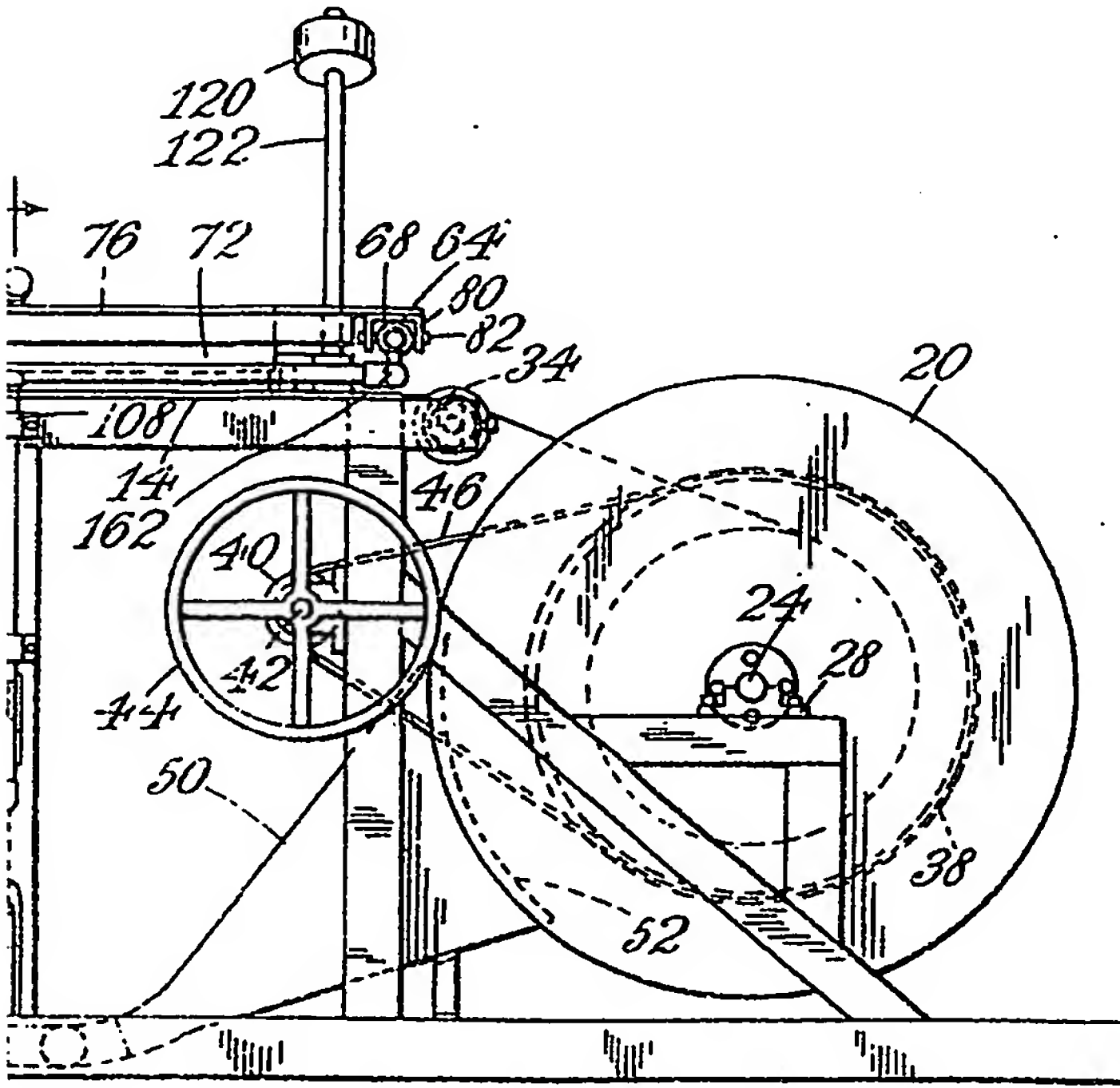
20. A method according to Claim 1 of colour-printing webs by means of a stencil, through which the colour is supplied to an underlying web on a supporting bed,
100 as hereinbefore described with reference to the accompanying drawings.

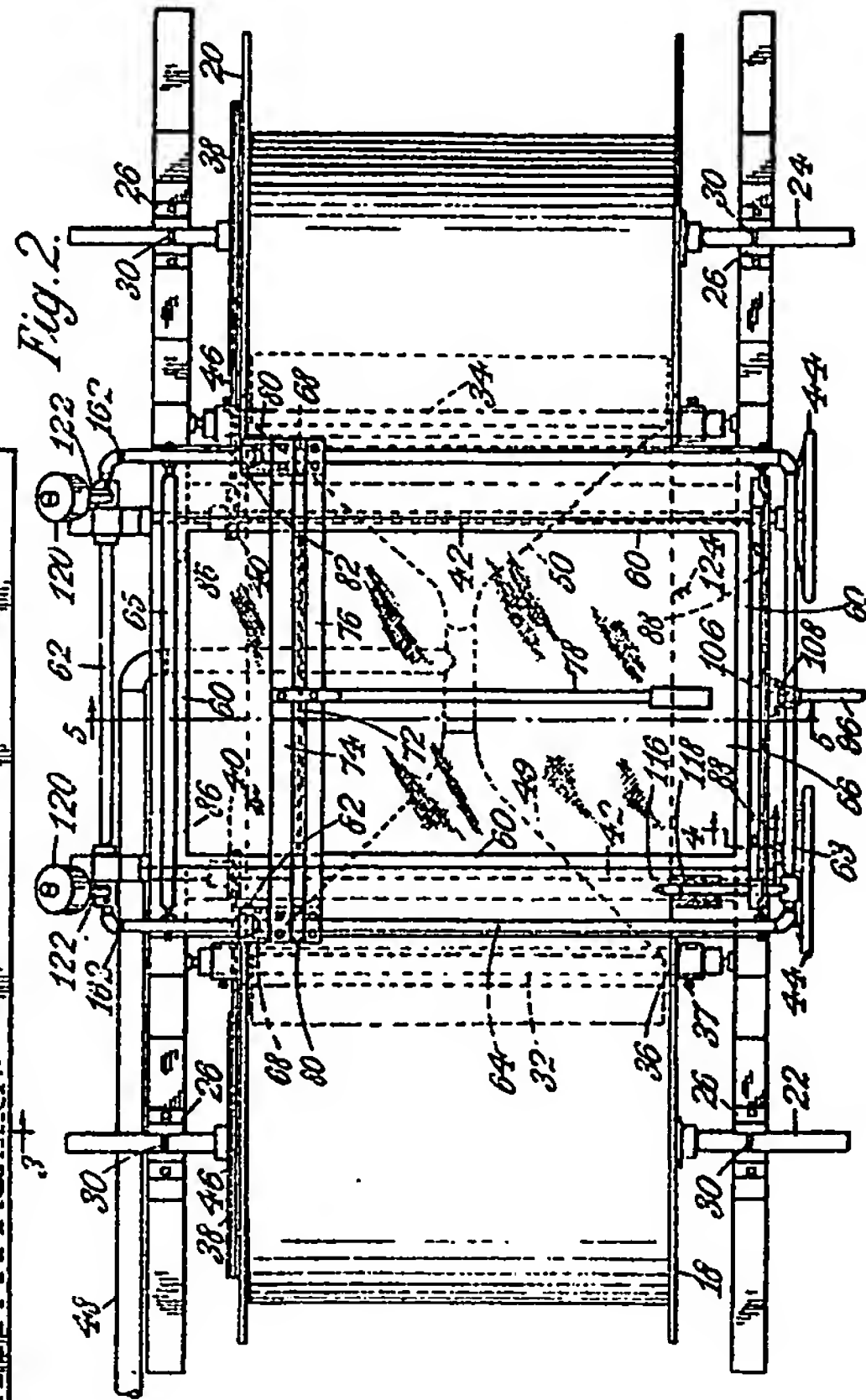
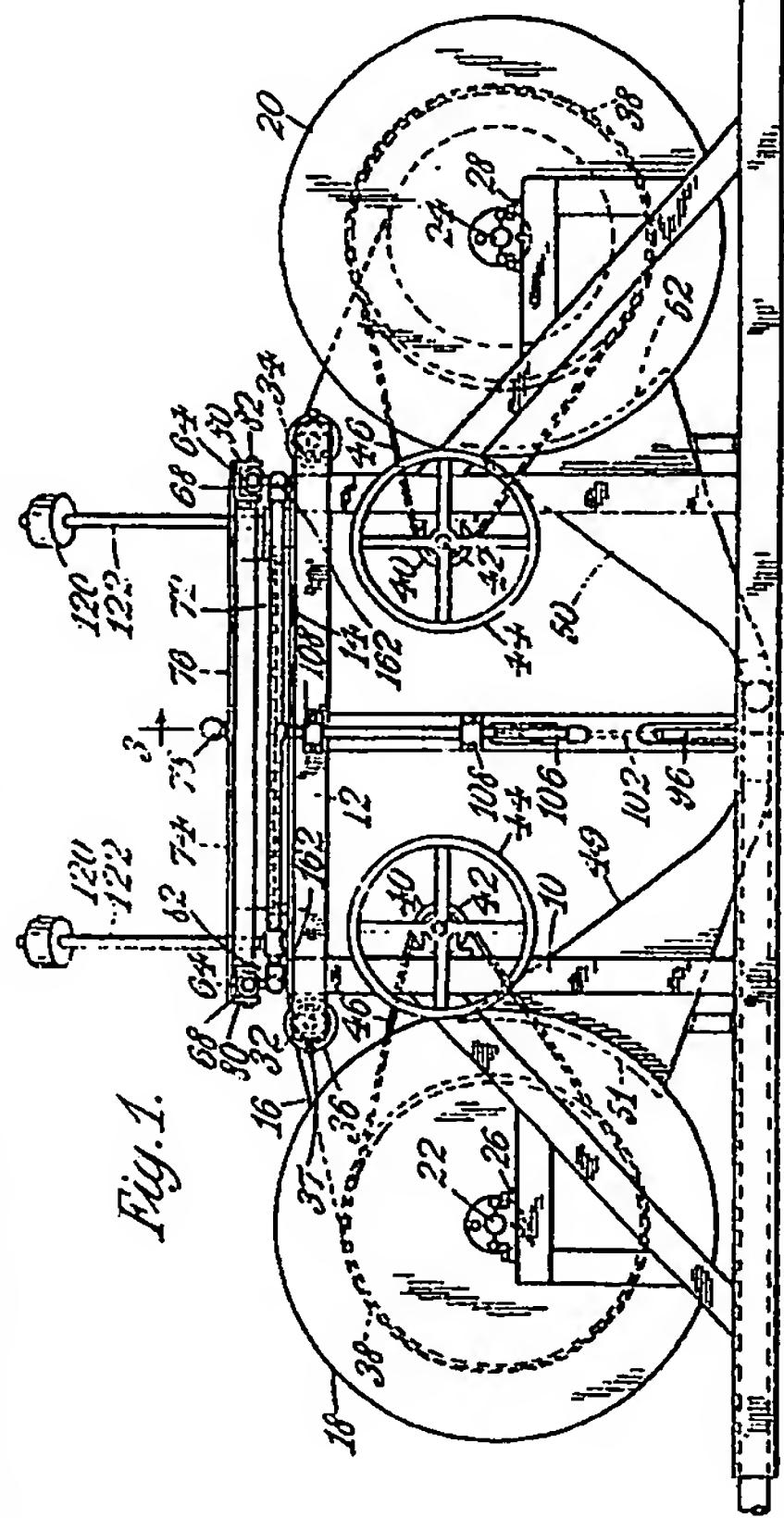
21. A machine for colour-printing webs as shown in the accompanying drawings.

Dated this 23rd day of January, 1939.
BOULT, WADE & TENNANT,
111 & 112, Hatton Garden,
London, E.C.1,
Chartered Patent Agents.



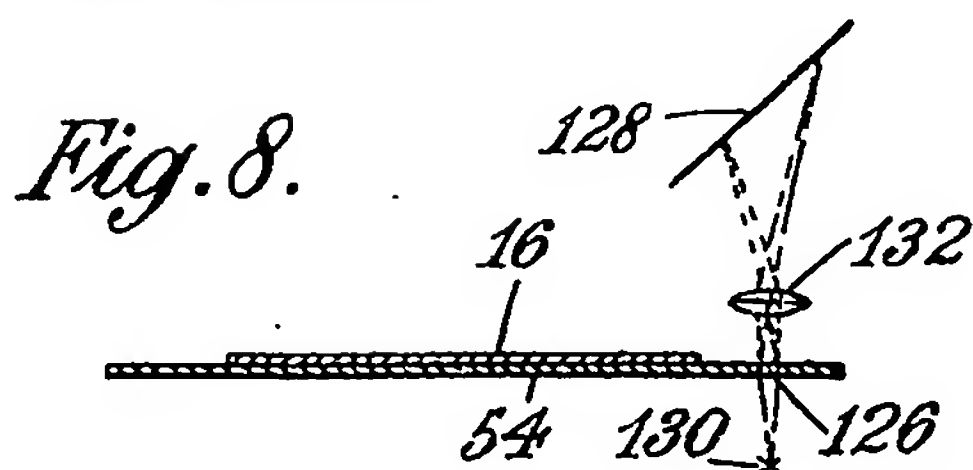
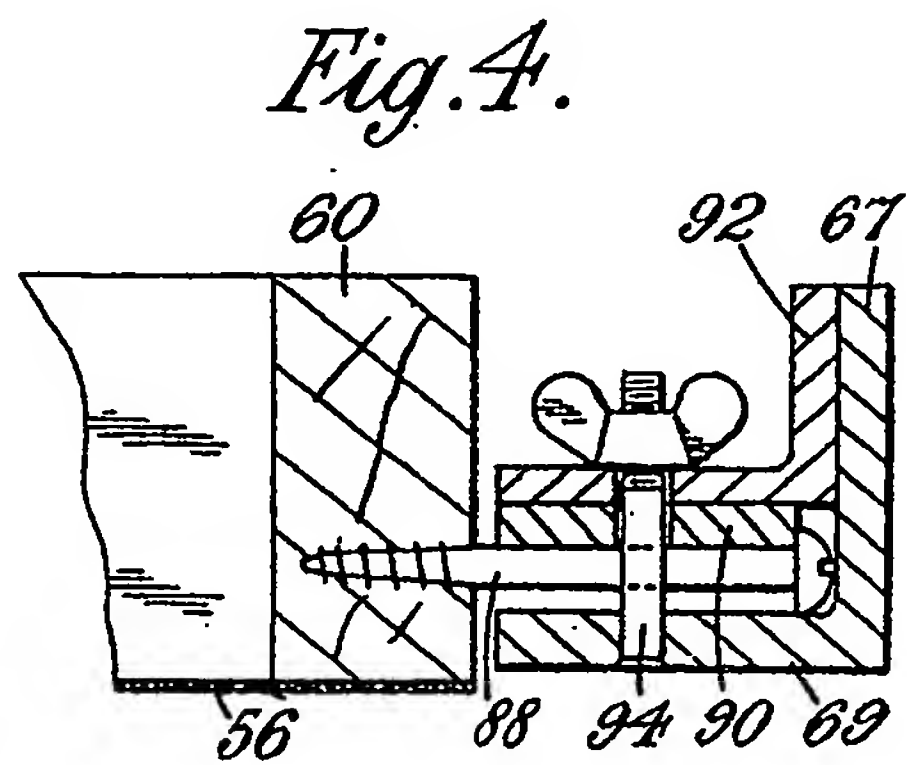
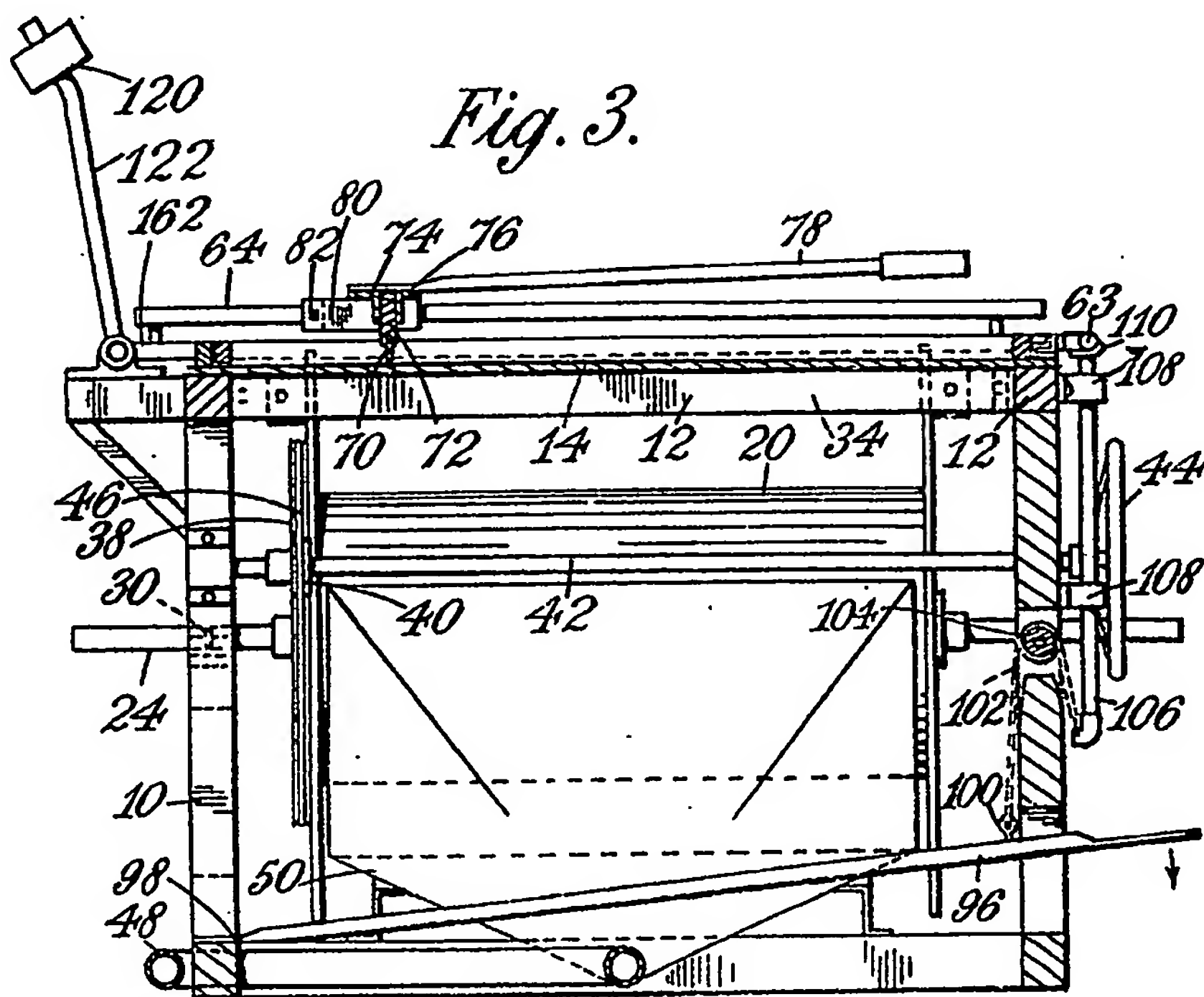
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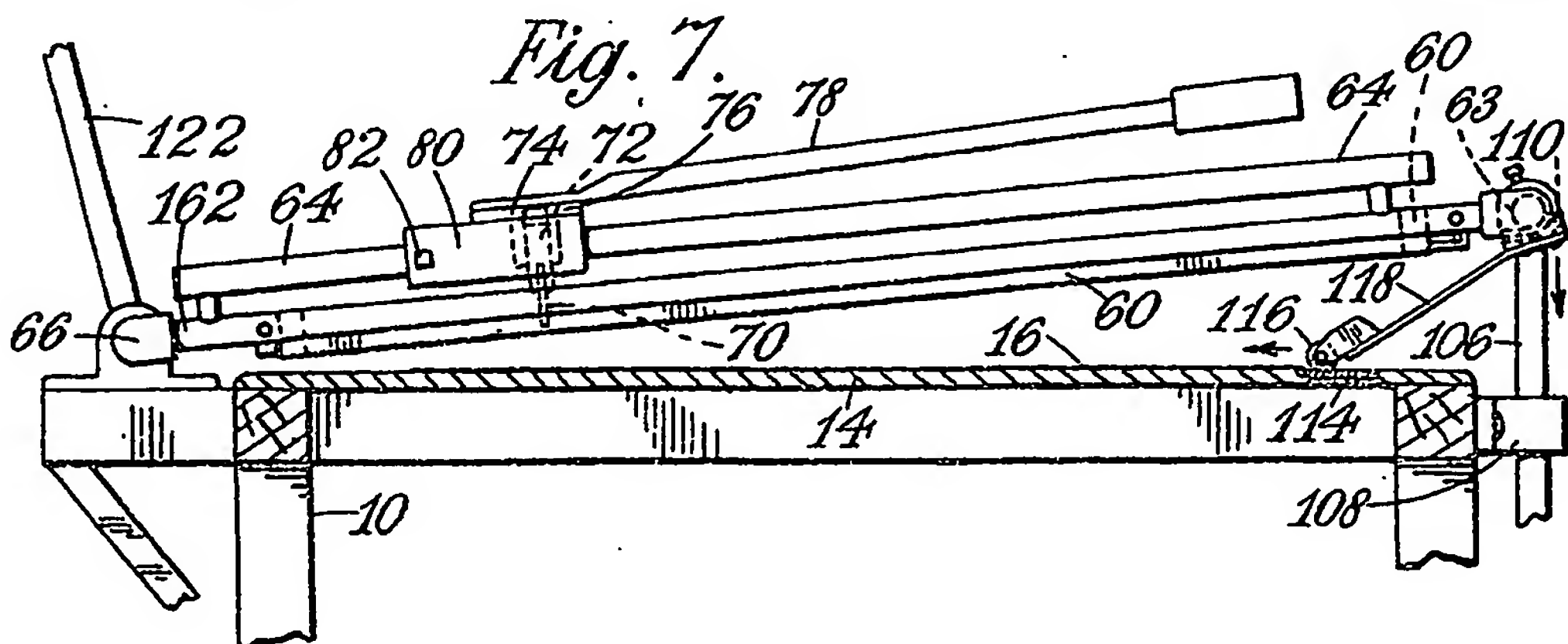
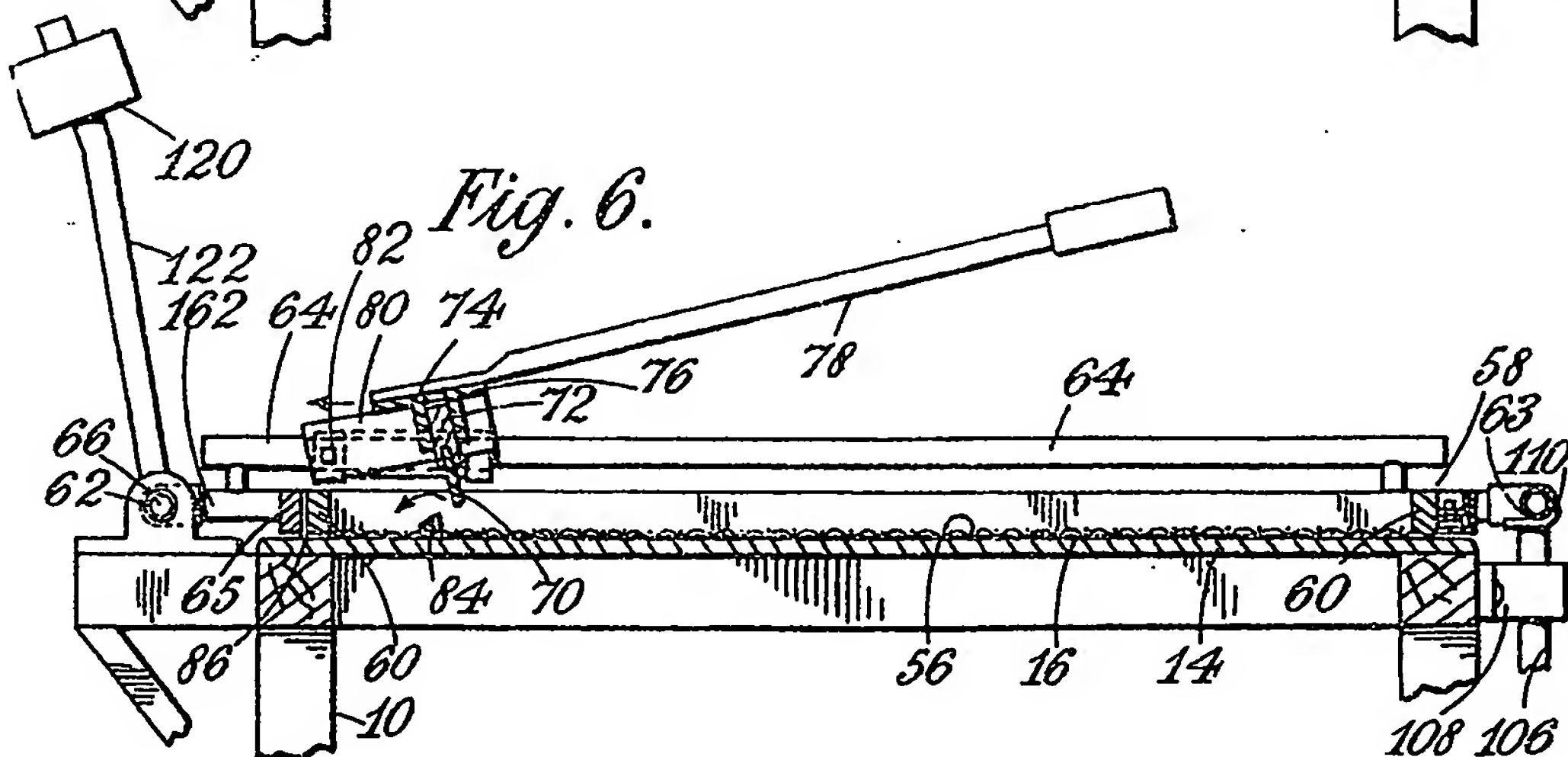
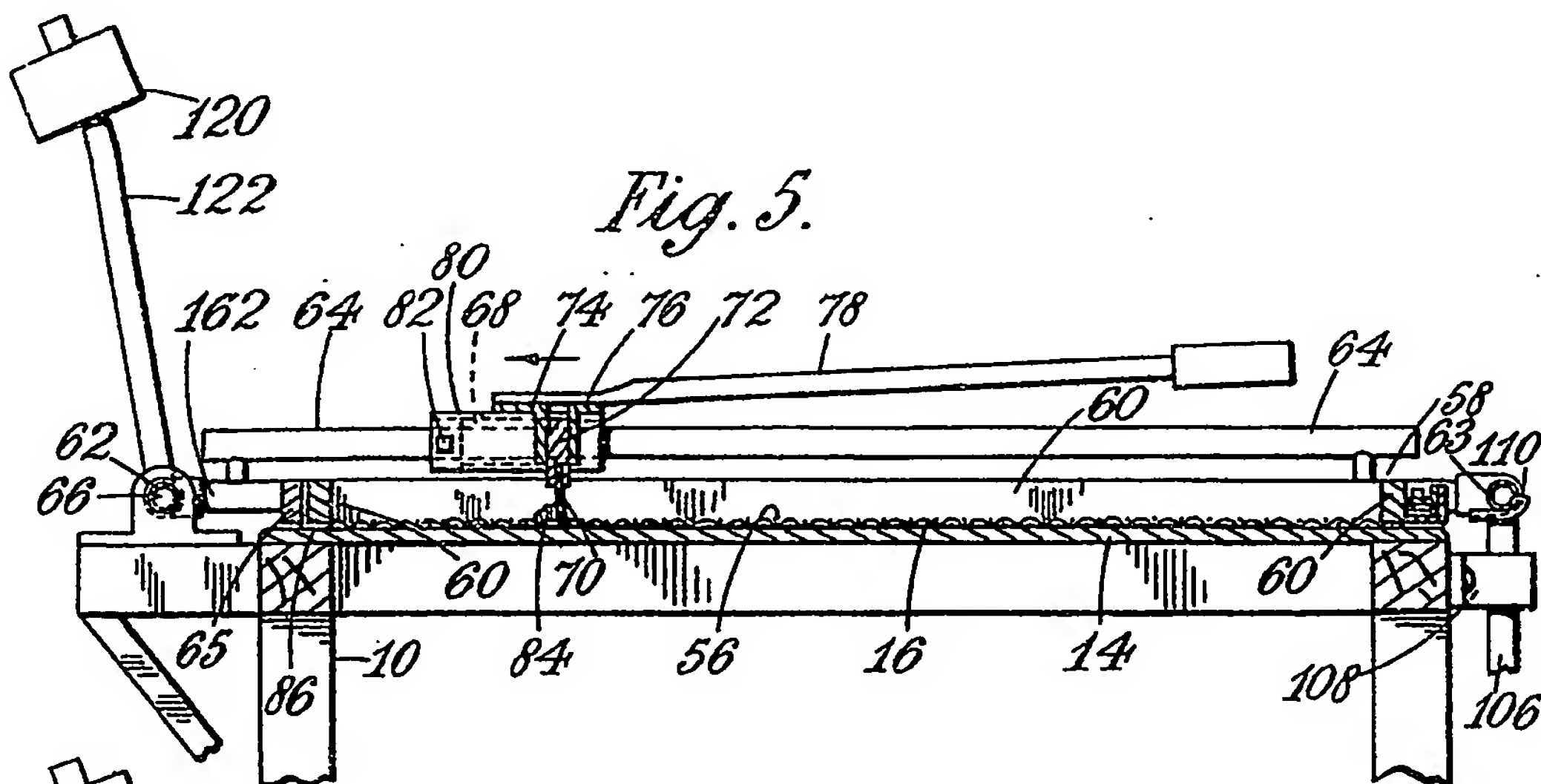




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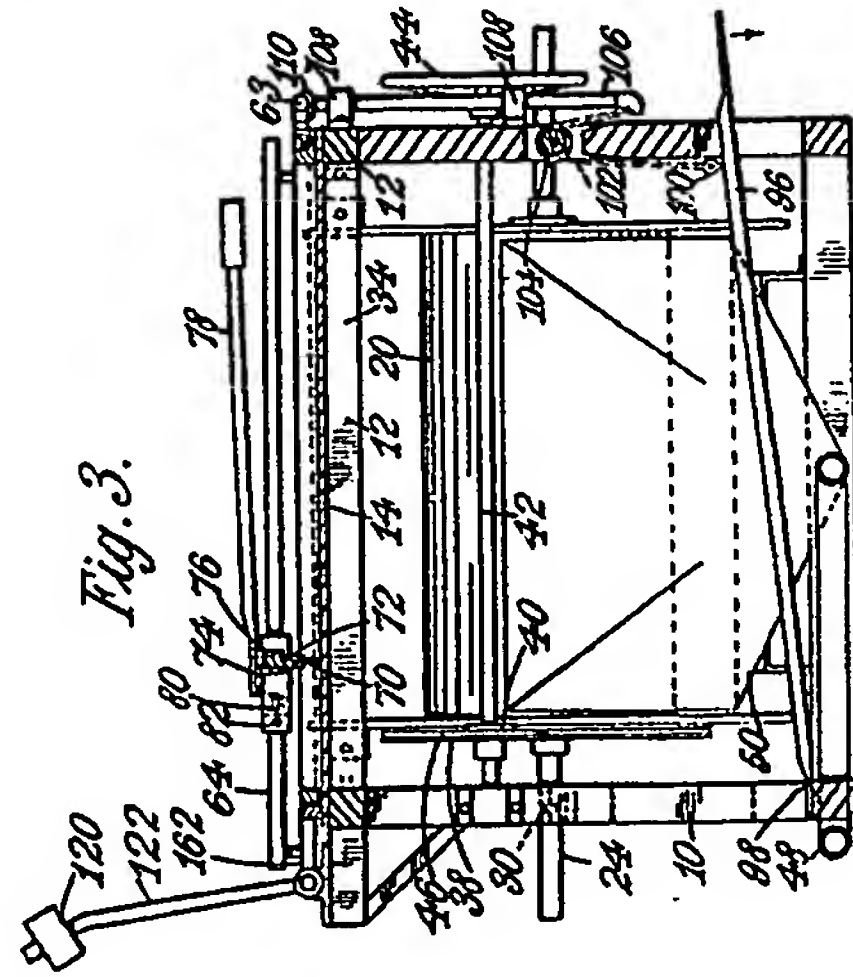


Fig. 3.

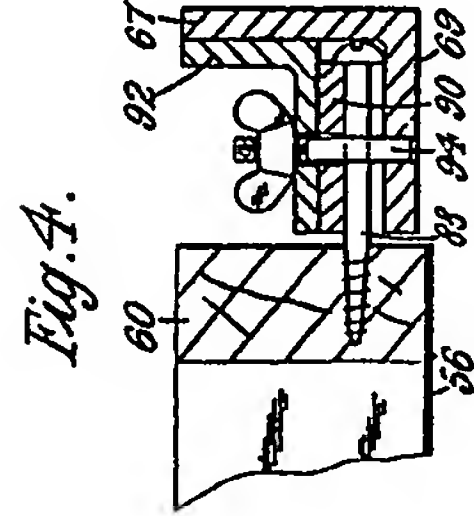


Fig. 4.

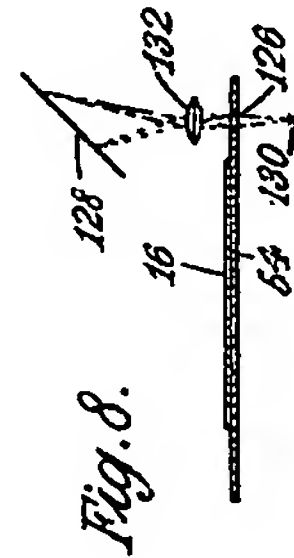


Fig. 8.

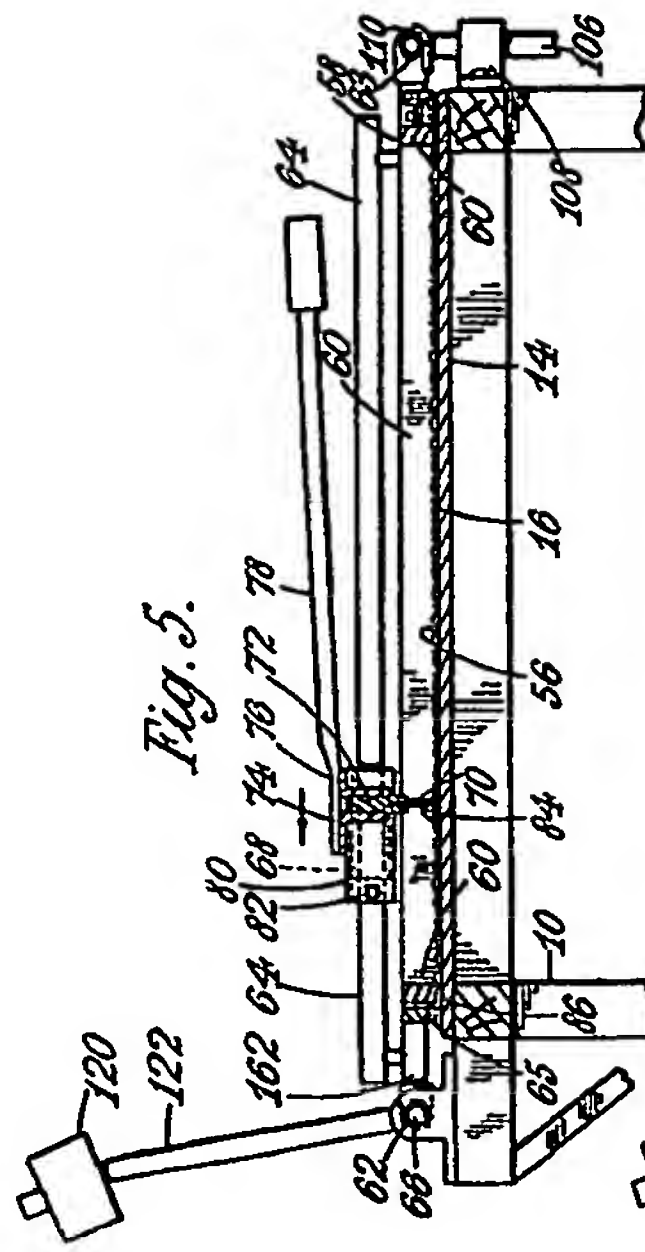


Fig. 5.

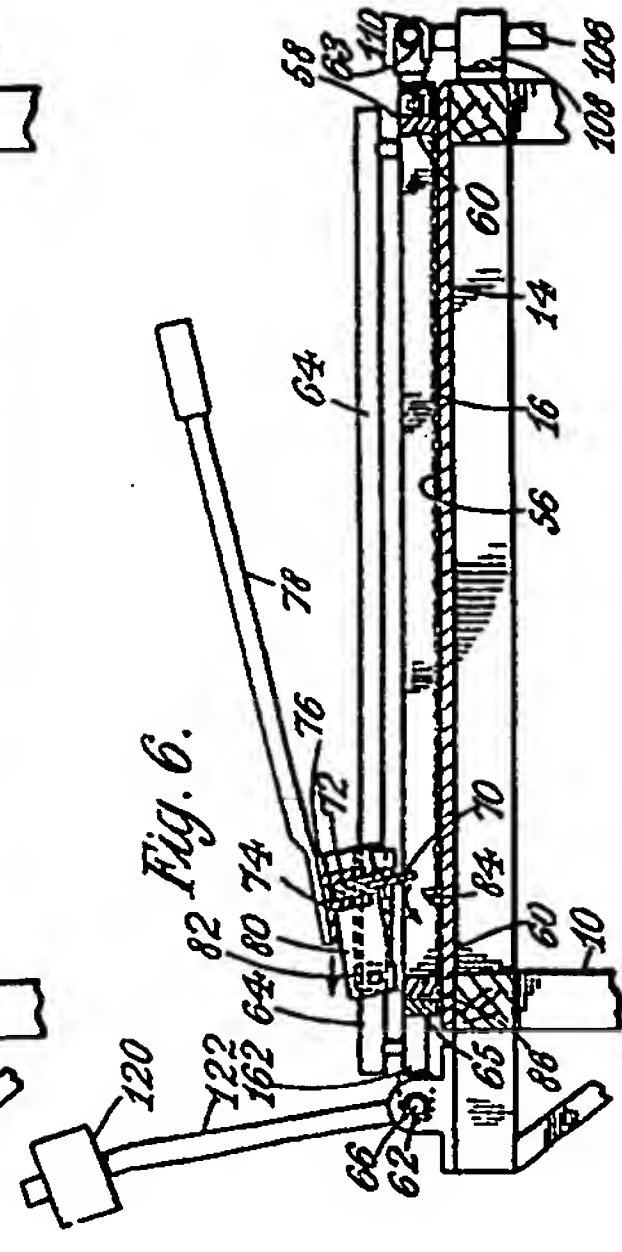


Fig. 6.

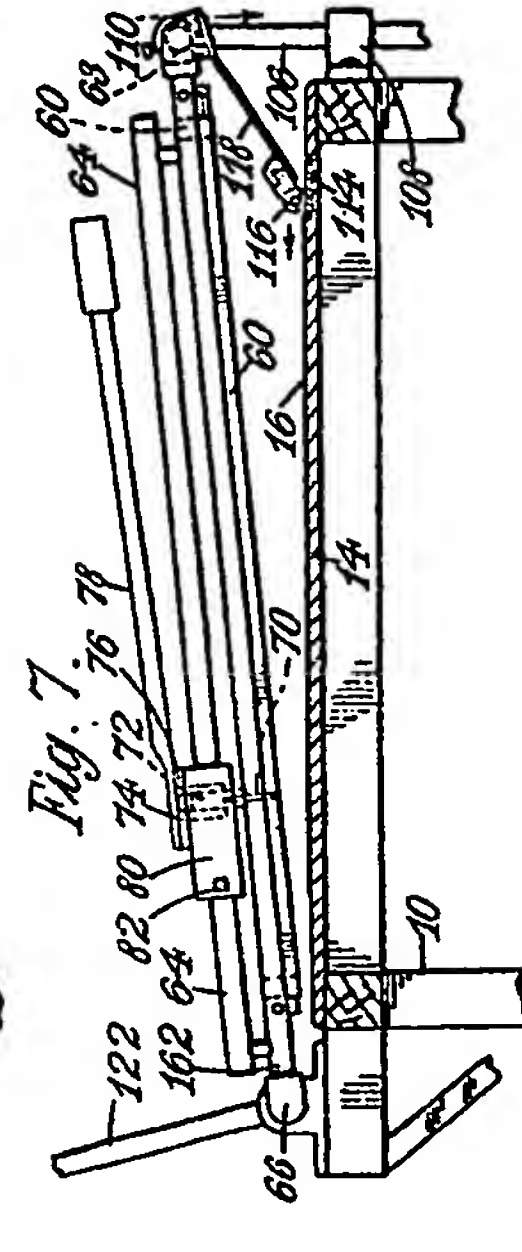


Fig. 7.

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